EFFECTS OF EXPERIENTIAL CONTACTS WITH GREEN INFRASTRUCTURE ON WELL-BEING OF RESIDENTS IN A SMALL TOWN

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Green infrastructure network - A composite of the green open spaces that is linked by streets, waterways and drainages encircling and connecting urban areas, at all spatial scales – an interconnected system of green infrastructure that is diverse, natural, coherent, clean, well maintained and equipped with facilities.

Experiential contacts - Expression of emotional feeling from viewing, being and actively engaging in activities in a green infrastructure.

Well-being – An inner state of wellness including physical, mental and emotional state of consonance and from social contacts which exists in a healthy environment.

Small town – a town under the category of major settlement or minor growth centre within the population of 10,000 to 100,000.
AIM OF RESEARCH

- Explorations on town residents’ experiences with green infrastructure.

- The focus on the effects of properties and attributes of green infrastructure to physical, cognitive and social well-being of the residents.
OBJECTIVE 1:
To investigate the presence of diversity, naturalness, coherence and additional attributes that forms experiences of a green infrastructure network in a small town.

KEY RQ 1:
What makes green infrastructure network in a town possible for the residents to physically and visually access it?

SUBSIDIARY QUESTIONS:
a) What are the types of green infrastructure that can be found in urban green environment?  
b) How is the green infrastructure in Malaysian towns distributed? Does green infrastructure network exist in Taiping?  
c) How do residents feel about the properties and attributes of green infrastructure which include diversity, naturalness, coherence and other additional attributes in the town?

OBJECTIVE 2:
To identify uses and experiences that residents make of the green infrastructure and feelings that they have towards the properties and attributes.

KEY RQ2:
How do properties and attributes of the green infrastructure assist the residents’ experiential contacts with nature and how do they affect their well-being?

SUBSIDIARY QUESTION 1:
How does the green infrastructure network contribute to urban residents’ experiences?  
- Do the majority of the residents utilise green infrastructure as their everyday setting?  
- What are the opportunities it offers to the residents?  
- What are the levels of the residents’ familiarity of the green infrastructure?

HYPOTHESIS:
Ho: Physical, cognitive and social well-being of the residents is independent to the properties and attributes of the green infrastructure.  
H1: Physical, cognitive and social well-being of the residents is dependent on properties and attributes of green infrastructure.

SUBSIDIARY QUESTION 2:
How do the properties and attributes of green infrastructure network affect physical, cognitive and social experience and well-being of the residents?  
- How do the residents benefits from their experiences in the green infrastructure?  
- Is there a significant difference of the effects of visiting different green infrastructure on well being of the residents?  
- How does green infrastructure network affect physical experience and well-being of the residents?  
- What are the residents’ feelings towards the attributes of the green infrastructure?  
- How does it affect their cognitive experience and performance?  
- Do the residents develop a sense of attachment (cognitive effects) to the green spaces?  
- How does green infrastructure affect residents’ social experience and well-being?  
- Which attributes of the green infrastructure have a strong influence on physical, cognitive and social well-being of the residents?

OBJECTIVE 3:
To determine the effects of experiential contacts with the green infrastructure network, and the relationships to well-being of residents, physically, cognitively and socially.

KEY RQ3:
How do the properties and attributes of green infrastructure assist the residents’ experiential contacts with nature and how do they affect their well-being?

SUBSIDIARY QUESTION 3:
How do the properties and attributes of green infrastructure network contribute to urban residents’ experiences?  
- Do the majority of the residents utilise green infrastructure as their everyday setting?  
- What are the opportunities it offers to the residents?  
- What are the levels of the residents’ familiarity of the green infrastructure?

OBJECTIVE 4:
To propose a conceptual model eliciting the interrelationships of residents’ experiential contacts with the green infrastructure network to physical, cognitive and social well-being.

HYPOTHESIS:
Ho: Physical, cognitive and social well-being of the residents is independent to the properties and attributes of the green infrastructure.  
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SUBSIDIARY QUESTION 4:
How do the properties and attributes of green infrastructure network affect physical, cognitive and social experience and well-being of the residents?  
- How do the residents benefits from their experiences in the green infrastructure?  
- Is there a significant difference of the effects of visiting different green infrastructure on well being of the residents?  
- How does green infrastructure network affect physical experience and well-being of the residents?  
- What are the residents’ feelings towards the attributes of the green infrastructure?  
- How does it affect their cognitive experience and performance?  
- Do the residents develop a sense of attachment (cognitive effects) to the green spaces?  
- How does green infrastructure affect residents’ social experience and well-being?  
- Which attributes of the green infrastructure have a strong influence on physical, cognitive and social well-being of the residents?
(1) **Built environment is a harmful impediment to biophilic needs of urban residents**
- from sedentary behaviour, high level of built-up urban pressures, increase immersion in the artificial human-made environment. Hence, residents disengage from the urban natural environment.

(2) **Issues on planning of urban green infrastructure**
- Lack of availability
- Lack of connectivity
- Management practices – e.g. poor quality in development plan, low maintenance, lack of manpower, budget, expertise, interest, lack of awareness and civic mindedness and lack of monitoring.
Lack of empirical evidences in Malaysia that determine physical and psychological effects of urban green infrastructure network.

Very few studies were found in landscape architecture and urban planning disciplines that explore which properties and attributes have the strongest positive effects, and what can be done to improve urban settings - contribute to the search for functional landscape designs beneficial to human well-being and sustainability.

Thus, this exploratory study is designed as an extension to the existing body of knowledge found in Western and European studies and to fill the gap on study in Malaysian setting.
1) PERCEPTUAL THEORIES

a) Evolution-based Theory
   i) Habitat specific
      • Savanna, Forest and Grassland-woodland Hypotheses.
   ii) Non-habitat specific
      • Prospect-refuge Theory (Appleton, 1975)
      • Landscape Preference Theory (Kaplan and Kaplan, 1982, 1989)
      • Biophilia Hypothesis (Wilson, 1984; Kellert and Wilson, 1993)

   “People have a more general innate bond with nature. Respond of people is in favour of natural settings than that of urban or man-made.”
   “The innately emotional affiliation is a fundamental component of building and sustaining good health”

b) Cultural Preference Theory
   • Topophilia (Tuan, 1974)

   “Human-nature relationships are predominantly dependent on the cultural background and personal attributes e.g. gender, occupation, hobbies, academic background.”

This study support mixture of these theories – responses to green infrastructure are innate as well as challenged and changed by cultural influences and experiences.

2) FRAMEWORKS that support the perceptual theories derived from urban ecosystem, conservation biology, landscape ecology, urban design, environmental planning and landscape architecture disciplines i.e. Tzoulas et al., 2007; Pickett & Cardenasso, 2008.
INTERRELATIONSHIPS OF THE PARAMETERS

**Independent parameters**

- **PHYSICAL DETERMINANTS**
  - Properties and attributes: Diversity, naturalness, coherence & additional attributes (cleanliness, maintenance, facilities)

- **EXPERIENTIAL CONTACTS**
  - Viewing in & out, being in & active engagements: kinetic-physical, leisure & social activities

- **PERCEPTUAL DETERMINANTS**
  - Perception; familiarity, preference

**Parameters that affect the link between cause and outcome**

**Dependent parameters (physiological effects)**

- Physical well-being
  - Feeling active; bodily healthy; mobility

- Cognitive well-being
  - Forget worries, relief stress & clear mind from distractions comfortable, relax and calm privacy; safe; preference; satisfaction; attachment

- Social well-being
  - Interactions with neighbours & other residents; participate; friendly and satisfied

*The interaction between human behaviour and the non-human environment (the green infrastructure network) as a two way process.*
**10 main types of green infrastructure**

**6 types of green open space:**
1) Recreational green infrastructure (The Lake Gardens),
2) Large open playfield, Public buildings and institutional grounds,
3) Designed pocket spaces
4) Small incidental and loose-fit green spaces,
5) Neighbourhood open spaces, home gardens, and
6) Existing private lands and undeveloped lands.

**4 types of green network:**
1) Transport corridors
2) Linear green spaces (commercial shop houses and five-foot walkways)
3) River corridors
4) Linear green spaces and reserves.
STRATEGIES OF INQUIRY

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<td>1) Surveys</td>
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<td>Self-administered questionnaire; quantitative closed-ended with open a few open-ended questions</td>
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<td>2) Semi-structured interview</td>
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<td>3) Behavioural observation</td>
<td>580-534</td>
<td>Unobtrusive observations and mapping of activities</td>
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STUDY DESIGN

- Exploratory & correlational study design
  - Review of literature
  - Theoretical frameworks & underpinnings

- Pragmatism knowledge claim
  - The context that was tested-Taiping

- Mixed-methods approach

- Analysis of data
  - Descriptive
  - Inferential
  - Content analysis

- Triangulation

FINDINGS
FINDINGS

Preliminary results

- Reliability tests
- Factor analyses

Residents’ characteristics

Main results

- Opportunities in the green infrastructure
- Experiential contacts with green infrastructure
- Effects to well-being
- Relationships between green infrastructure and well-being

Conclusion on the presence of green infrastructure network

Conclusion on the effects of experiential contacts with green infrastructure attributes
6 main FINDINGS

1) **Visits to green infrastructure** (RO2 & RQ2)
   - Residents regularly used the green infrastructure. The act of visiting or not visiting does not depend on residents’ characteristics.

2) **Familiarity** (RO2 & RQ2)
   - With at least 6 types of green infrastructure.
   - Residents were more familiar with green open spaces than green network.

3) **Activities** (RO2 & RQ2)
   - Residents were actively engaged in at least 22 types of activities.

4) **Experience of green infrastructure’s attributes** (RO1 & RQ1)
   - Diversity, naturalness and coherence are presence in Taiping. E.g. The Lake Gardens has high diversity & naturalness, hills (naturalness), neighbourhood (proximity).
   - The attributes shaped preferences

5) **Effects to well-being** (RO3 & RQ2)
   - **Benefits** - The experience fulfils nature and human interactions needs. Residents felt affiliated with the green infrastructure.
   - **Physical well-being** – residents achieved at least 6 types of physical effects (active living, feeling bodily healthy, etc.).
   - **Cognitive well-being** – at least 13 cognitive effects (emotional relief, comfort, relaxed, calmness, etc).
   - **Social well-being** – at least 6 social effects (interactions, participation, satisfaction).
6) Relationships of attributes and well-being (RO3 & hypotheses)
- Diversity affects physical well-being the most.
- Naturalness affects cognitive well-being the most.
- Coherence affects cognitive and social well-being the most.

Cause-effect relationship from green infrastructure
A conceptual model (RO4)

Viewing, being with the attributes and engaging in physical, leisure and social activities contribute to familiarity, frequent visits, preference, satisfaction and attachment that lead to well being.
IMPLICATIONS

THEORETICAL and PRACTICAL

- The presence of these properties and attributes assists sequential experience. The green infrastructure is integrated, providing concentration nodes and vital channels of movement that fulfil their needs for nature and interaction.
- Green infrastructure network is essential amenity that produces healthy environment.
- Criteria – Green infrastructure must be reflected much more clearly in urban planning policies to ensure that towns are liveable and green spaces are attractive to urban residents.